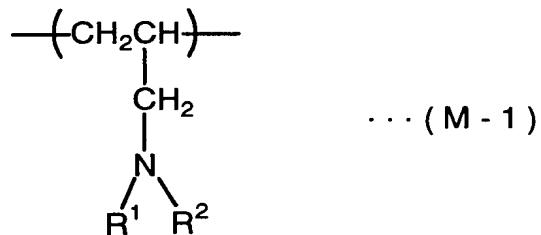


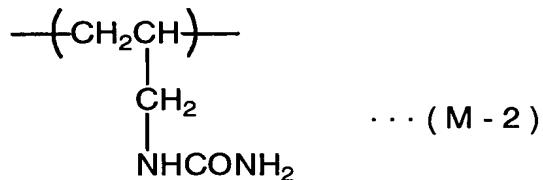
CLAIMS

1. A modified polyallylamine comprising, as an essential component, a unit of the general formula (M-1),



wherein each of  $\text{R}^1$  and  $\text{R}^2$  is independently an alkyl group having 1 to 4 carbon atoms,

comprising at least one unit selected from units of the formula (M-2),

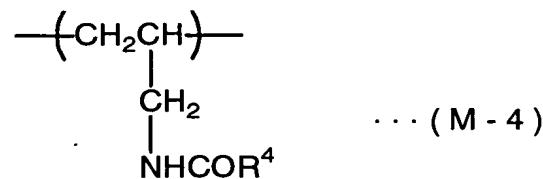


the general formula (M-3),



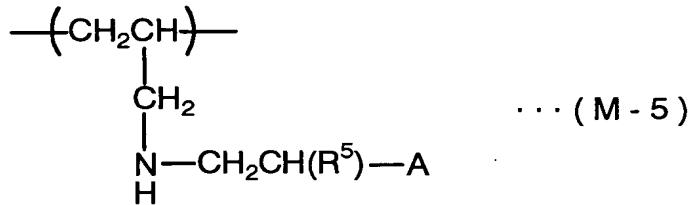
wherein  $\text{R}^3$  is an alkyl group having 1 to 12 carbon atoms or an aryl group having 6 to 12 carbon atoms,

15 the general formula (M-4),



wherein R<sup>4</sup> is an alkyl group having 1 to 12 carbon atoms,

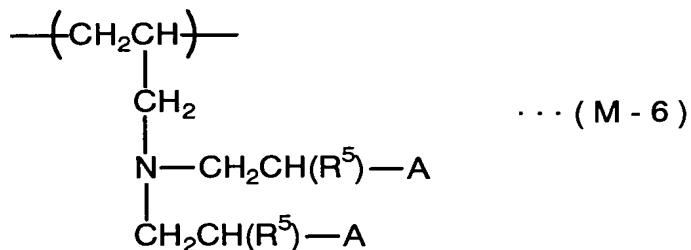
the general formula (M-5),



5       wherein R<sup>5</sup> is a hydrogen atom or methyl and A is -CONR<sup>6</sup>R<sup>7</sup>, -CN or -COOR<sup>8</sup>, in which each of R<sup>6</sup> and R<sup>7</sup> is independently a hydrogen atom or an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, a keto group, a mono(C<sub>1</sub>-C<sub>4</sub> alkyl) amino group, a di(C<sub>1</sub>-C<sub>4</sub> alkyl) amino group or a tri(C<sub>1</sub>-C<sub>4</sub> alkyl) ammonium group, and R<sup>6</sup> and R<sup>7</sup> may bond to each other and form a piperidino or morpholino group together with a nitrogen atom, and R<sup>8</sup> is an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, a keto group, a mono(C<sub>1</sub>-C<sub>4</sub> alkyl) amino group, a di(C<sub>1</sub>-C<sub>4</sub> alkyl) amino group or a tri(C<sub>1</sub>-C<sub>4</sub> alkyl) ammonium group,

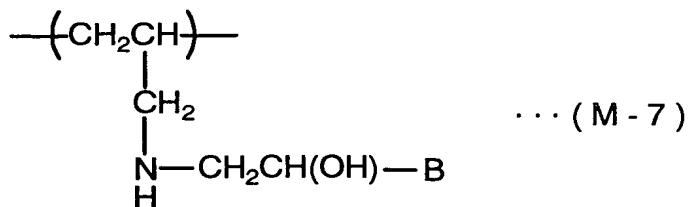
10       the general formula (M-6),

15       the general formula (M-7),



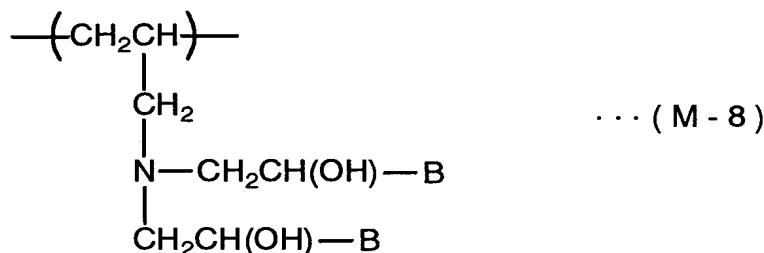
wherein R<sup>5</sup> and A are as defined above,

20       the general formula (M-7),

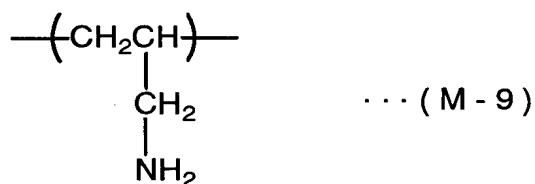


wherein B is an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, an alkoxy or alkenyloxy group having 1 to 4 carbon atoms,

5 and the general formula (M-8),

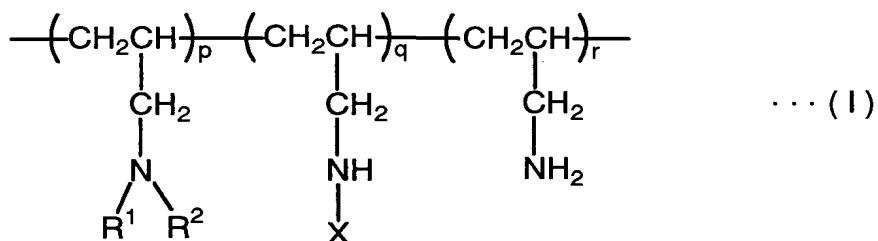


wherein B is as defined as said B,  
and optionally containing a unit of the formula (M-9),



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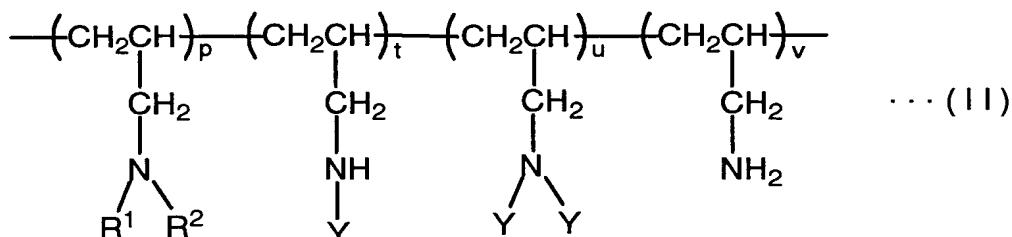
2. A modified polyallylamine having a structure of the general formula (I),



15 wherein each of R<sup>1</sup> and R<sup>2</sup> is independently an alkyl

group having 1 to 4 carbon atoms, X is  $-\text{CONH}_2$ ,  $-\text{COOR}^3$ , in which  $\text{R}^3$  is an alkyl group having 1 to 12 carbon atoms or an aryl group having 6 to 12 carbon atoms, or  $-\text{COR}^4$ , in which  $\text{R}^4$  is an alkyl group having 1 to 12 carbon atoms, each of p 5 and q is independently an integer of 1 or more, and r is 0 or an integer of 1 or more.

3. A modified polyallylamine having a structure of the general formula (II),

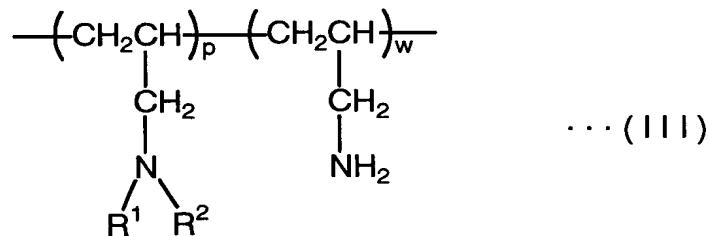


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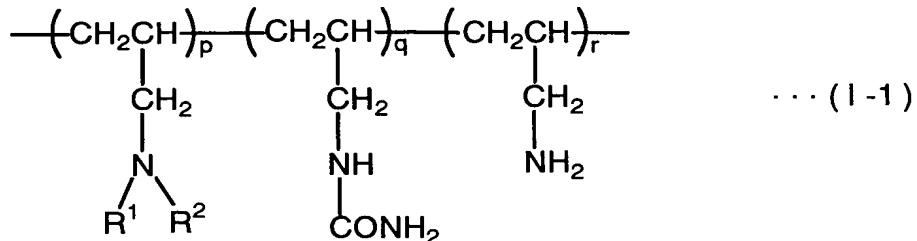
wherein each of  $\text{R}^1$  and  $\text{R}^2$  is independently an alkyl group having 1 to 4 carbon atoms, Y is  $-\text{CH}_2\text{CH}(\text{R}^5)-\text{A}$ , in which  $\text{R}^5$  is a hydrogen atom or methyl and A is  $-\text{CONR}^6\text{R}^7$ ,  $-\text{CN}$  or  $-\text{COOR}^8$ , in which each of  $\text{R}^6$  and  $\text{R}^7$  is independently a 15 hydrogen atom or an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, a keto group, a mono( $\text{C}_1\text{-C}_4$  alkyl) amino group, a di( $\text{C}_1\text{-C}_4$  alkyl) amino group or a tri( $\text{C}_1\text{-C}_4$  alkyl) ammonium group,  $\text{R}^6$  and  $\text{R}^7$  may bond to each other to form a piperidino or morpholino group 20 together with a nitrogen atom, and  $\text{R}^8$  is an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, a keto group, a mono( $\text{C}_1\text{-C}_4$  alkyl) amino group, a di( $\text{C}_1\text{-C}_4$  alkyl) amino group or a tri( $\text{C}_1\text{-C}_4$  alkyl group) ammonium group, or  $-\text{CH}_2\text{CH}(\text{OH})-\text{B}$ , in which B is an 25 alkyl group having 1 to 8 carbon atoms and optionally

containing a hydroxyl group or an alkoxy or alkenyloxy group having 1 to 4 carbon atoms, p is an integer of 1 or more, and each of t, u and v is independently 0 or an integer of 1 or more, provided that at least one of t and u 5 is an integer of 1 or more.

4. A process for producing a modified polyallylamine of the general formula (I-1), which comprises reacting a cyanic acid with a copolymer of N,N-dialkylallylamine and 10 an allylamine, represented by the general formula (III),



wherein each of R<sup>1</sup> and R<sup>2</sup> is independently an alkyl group having 1 to 4 carbon atoms and each of p and w is independently an integer of 1 or more, 15 to produce the modified polyallylamine of the general formula (I-1),

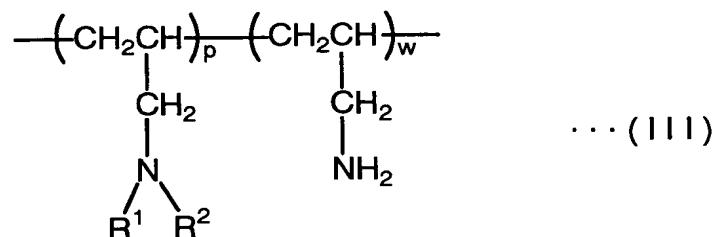


wherein q is an integer of 1 or more, r is 0 or an integer of 1 or more and R<sup>1</sup>, R<sup>2</sup> and p are as defined above.

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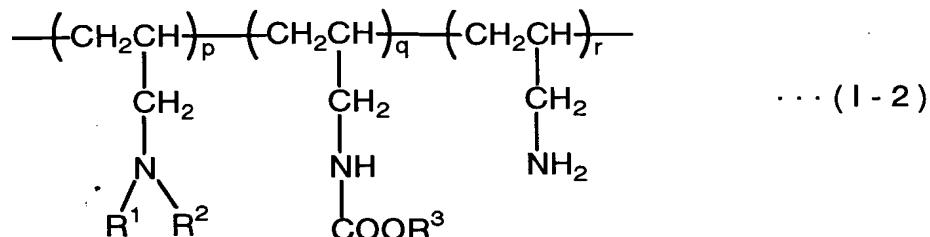
5. A process for producing a modified polyallylamine

of the general formula (I-2), which comprises reacting an alkoxy carbonylation agent having 1 to 12 carbon atoms or an aryloxy carbonylation agent having 6 to 12 carbon atoms with a copolymer of N,N-dialkylallylamine and an allylamine,  
5 represented by the general formula (III),



wherein each of  $\text{R}^1$  and  $\text{R}^2$  is independently an alkyl group having 1 to 4 carbon atoms and each of  $p$  and  $w$  is independently an integer of 1 or more,

10 to produce the modified polyallylamine of the general formula (I-2),

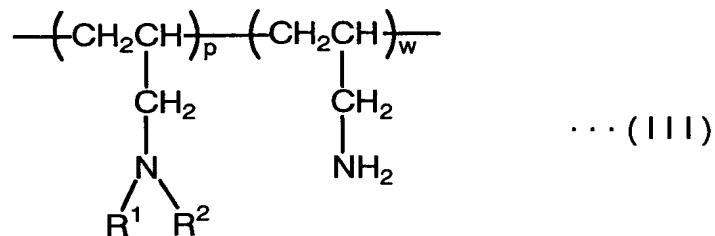


wherein  $\text{R}^3$  is an alkyl group having 1 to 12 carbon atoms or an aryl group having 6 to 12 carbon atoms,  $q$  is an integer of 1 or more,  $r$  is 0 or an integer of 1 or more, and  $\text{R}^1$ ,  $\text{R}^2$  and  $p$  are as defined above.

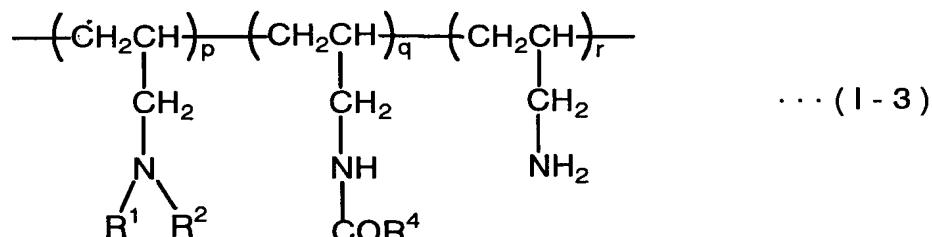
6. The process for producing a modified polyallylamine as claimed in claim 5, wherein the alkoxy carbonylation agent or the aryloxy carbonylation agent is a carbonate diester represented by  $\text{R}^3\text{O}-\text{CO}-\text{OR}^3$  in which  $\text{R}^3$  is an alkyl

group having 1 to 12 carbon atoms or an aryl group having 6 to 12 carbon atoms.

7. A process for producing a modified polyallylamine of the general formula (I-3), which comprises reacting an acylation agent having 1 to 12 carbon atoms with a copolymer of N,N-dialkylallylamine and an allylamine, represented by the general formula (III),



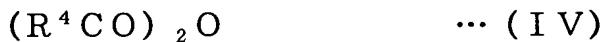
10 wherein each of  $\text{R}^1$  and  $\text{R}^2$  is independently an alkyl group having 1 to 4 carbon atoms and each of  $p$  and  $w$  is independently an integer of 1 or more, to produce the modified polyallylamine of the general formula (I-3),



15 wherein  $\text{R}^4$  is an alkyl group having 1 to 12 carbon atoms,  $q$  is an integer of 1 or more,  $r$  is 0 or an integer of 1 or more, and  $\text{R}^1$ ,  $\text{R}^2$  and  $p$  are as defined above.

20 8. The process for producing a modified polyallylamine as claimed in claim 7, wherein the acylation agent is an

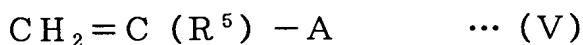
carboxylic anhydride of the general formula (IV),



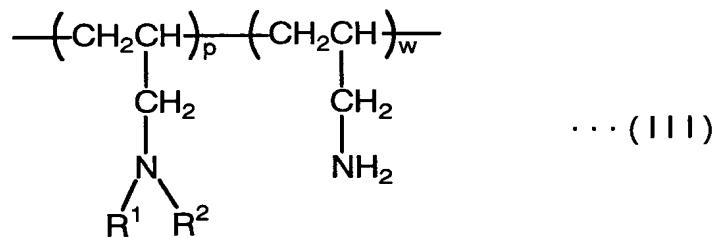
wherein  $R^4$  is an alkyl group having 1 to 12 carbon atoms.

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9. A process for producing a modified polyallylamine of the general formula (II-1), which comprises reacting an acryl compound of the general formula (V),

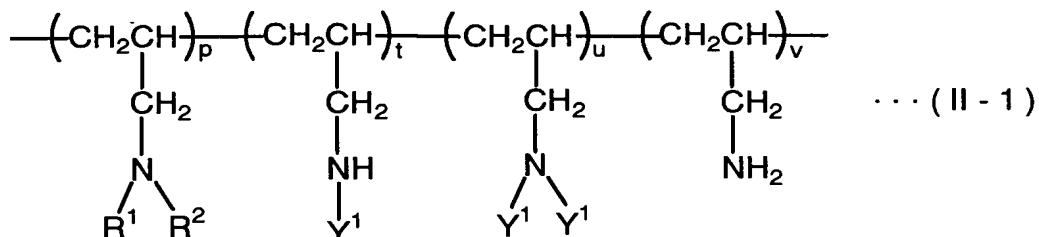


10 wherein  $R^5$  is a hydrogen atom or methyl and A is  $-CONR^6R^7$ ,  $-CN$  or  $-COOR^8$ , in which each of  $R^6$  and  $R^7$  is independently a hydrogen atom or an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, a keto group, a mono( $C_1-C_4$  alkyl) amino group, a di( $C_1-C_4$  alkyl) amino group or a tri( $C_1-C_4$  alkyl) ammonium group and  $R^6$  and  $R^7$  may bond to each other and form a piperidino or morpholino group together with a nitrogen atom, and  $R^8$  is an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, a keto group, a mono( $C_1-C_4$  alkyl) amino group, a di( $C_1-C_4$  alkyl) amino group or a tri( $C_1-C_4$  alkyl) ammonium group, with a copolymer of  $N,N$ -dialkylallylamine and an allylamine, represented by the general formula (III),



25 wherein each of  $R^1$  and  $R^2$  is independently an alkyl

group having 1 to 4 carbon atoms and each of p and w is independently an integer of 1 or more, to produce the modified polyallylamine of the general formula (II-1),

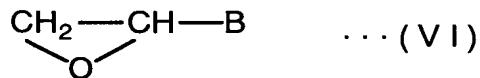


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wherein  $\text{Y}^1$  is a  $-\text{CH}_2\text{CH}(\text{R}^5)-\text{A}$ , each of t, u and v is independently 0 or an integer of 1 or more, provided that at least one of t and u is an integer of 1 or more, and  $\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^5$ , A and p are as defined above.

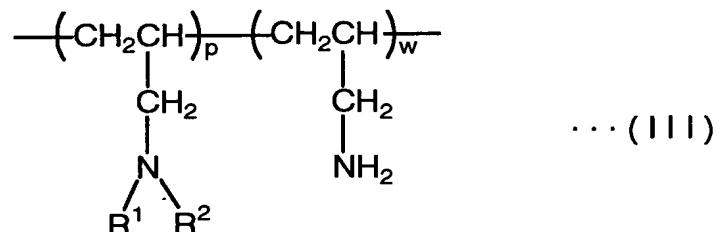
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10. A process for producing a modified polyallylamine of the general formula (II-2), which comprises reacting an epoxy compound of the general formula (VI),



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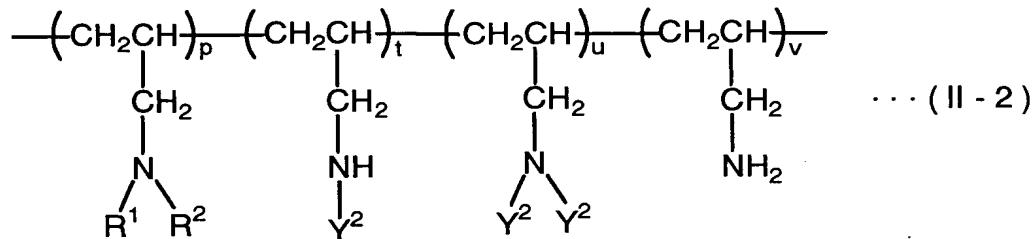
wherein B is an alkyl group having 1 to 8 carbon atoms and optionally containing a hydroxyl group, an alkoxy or alkenyloxy group having 1 to 4 carbon atoms, with a copolymer of N,N-dialkylallylamine and an allylamine, represented by the general formula (III),



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wherein each of  $R^1$  and  $R^2$  is independently an alkyl group having 1 to 4 carbon atoms and each of  $p$  and  $w$  is independently an integer of 1 or more,  
 to produce the modified polyallylamine of the general

5 formula (II-2),



wherein  $Y^2$  is a  $\text{CH}_2\text{CH}(\text{OH})-\text{B}$ , each of  $t$ ,  $u$  and  $v$  is independently an integer of 1 or more, provided that at least one of  $t$  and  $u$  is an integer of 1 or more, and  $R^1$ ,  $R^2$ ,  
 10  $B$  and  $p$  are as defined above.